

## PATENT ABSTRACTS OF JAPAN

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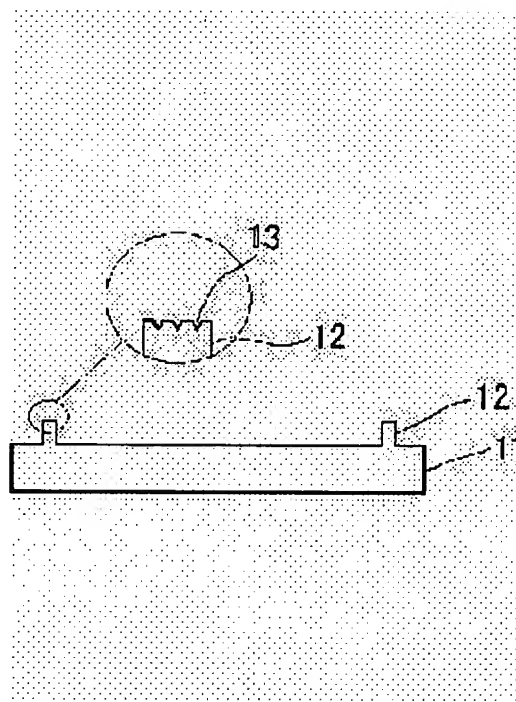
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## (54) PRINTING PLATE FOR TRANSFERRING SEALING AGENT FOR LIQUID CRYSTAL PANEL ALIGNMENT

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide a printing plate for transferring a sealing agent for liquid crystal panel alignment, particularly capable of transferring a relatively large amount of a sealing agent and for preventing a place with no sealing agent transferred from being generated and making an edge of a transferred sealing agent to be sharp.

SOLUTION: In this printing plate, a linear relief part 12 provided with a point surface for applying the sealing agent 2 is formed integrally with a support 11 for supporting the relief part 12. The linear relief part 12 and the support 11 are generally made of cured photosensitive resin. The point surface of the relief part 12 is provided with recessed parts. The width of the linear relief part 12 generally ranges between 200 and 400  $\mu\text{m}$ , and the linear relief part 12 is almost a quadrangle as a whole. The recessed parts may be linear recessed parts 13, almost cylindrical recessed parts 14, and further, grid-like recessed parts. In the case of the linear recessed parts 13, three linear recessed parts 13 preferably exist along the lengthwise direction of the linear relief part 12.



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the printing version which uses the sealing compound for sticking a liquid crystal base for imprinting on a liquid crystal base.

[0002]

[Description of the Prior Art] Generally, a liquid crystal display is the following, and is made and created. That is, the orientation film 3 is formed in the fixed partition of the glass base 1, and predetermined surface treatment is performed on this orientation film 3. Then, a sealing compound 2 is formed so that this orientation film 3 may be surrounded. And this pair is stuck as sealing-compound 2 comrades contact. Then, liquid crystal is poured in and enclosed from an inlet 4, and a liquid crystal display is obtained.

[0003] Conventionally, as an approach of forming a sealing compound 2, screen printing is adopted, for example. That is, fill parts other than the part which makes a sealing compound 2 ooze using a screen (mesh-like objects, such as mesh textiles), only a sealing compound 2 is made to ooze, and a sealing compound 2 is formed in a predetermined part. However, the screen contacted the orientation film 3 and this approach had a possibility of damaging the orientation film 3. If the orientation film 3 by which surface treatment was carried out especially gets damaged, liquid crystal will not be fixed to homogeneity but the fault that a liquid crystal display does not become homogeneity or homogeneity will be caused.

[0004] For the \*\* reason, it replaces with screen-stencil and the dispenser applying method is also adopted. The dispenser applying method applies a sealing compound 2 only to a predetermined part using the extruder (a thing like a syringe) of a sealing compound 2. The orientation film 3 and an extruder do not contact and this approach does not damage the orientation film 3. However, moving an extruder to a predetermined part, the sealing compound 2 had to be applied and there was a fault that spreading of a sealing compound 2 took time amount, namely, transit time started it. Therefore, compared with screen printing, creation of a liquid crystal display could not carry out in a short time, but there was a grudge of not being rational.

[0005]

[Problem(s) to be Solved by the Invention] Then, this invention person etc. thought that what is necessary was just to print and imprint a sealing compound 2 by the typographic printing method. A typographic printing method is the approach of applying printing ink etc. to the apical surface of the relief section, and imprinting this to a printed side using the printing version which consists of the relief section and a base material which supports the relief section. Therefore, there is no possibility that any parts other than the relief section may not contact a printed side, and may damage the orientation film 3. However, when the sealing compound was applied to the apical surface of the relief section and this was imprinted on the glass base by the typographic printing method, it might be said that there were few amounts of imprints and predetermined imprint height could not be obtained. That is, when predetermined imprint height was not obtained, a base was stuck and a liquid crystal display was

created, the gap between bases might become small and it might be said that liquid crystal of the amount of requests could not be enclosed. Moreover, since there were few amounts of imprints, it might be said that the part where a sealing compound is not imprinted was generated. That is, when the part which is not imprinted existed, air remained into this part and air expanded by ambient temperature, and the lamination section of the obtained liquid crystal display might exfoliate, and it might be said that liquid crystal leaked and it came out. Furthermore, the notch might arise in the edge of the imprinted sealing compound, and the sharp imprint of a sealing compound could not be performed, but it might be said that a sealing compound adhered to the orientation film.

[0006] In order to solve the above-mentioned fault, when this invention person etc. established the crevice in the apical surface of the relief section and coverage of a sealing compound was made [ many ], he thought that the fault that the amount of imprints decreases could be prevented. And it became clear that the sharp imprint of a sealing compound could moreover also be realized, without generating the part where a sealing compound is not imprinted by not expecting, while being able to make [ many ] the amount of imprints when experimented by establishing a crevice in the apical surface of the relief section actually. This invention is based on such knowledge.

[0007]

[Means for Solving the Problem] namely, the line possessing an apical surface for this invention to apply a sealing compound -- it is related with the printing version for imprinting the sealing compound for liquid crystal base lamination characterized by coming to unify the relief section and the base material for supporting this relief section, and establishing the crevice in this apical surface.

[0008] The printing version concerning this invention consists of a base material 11 and the relief section 12. It is unified and this base material 11 and the relief section 12 are formed with the photopolymer generally hardened. As a photopolymer, a well-known thing is used conventionally, for example, various kinds of APR resin by Asahi Chemical Industry Co., Ltd. can be used. Generally the thickness of a base material 11 is about 1-3mm. Moreover, generally the thickness (height) of the relief section 12 is about 0.5-1.5mm.

[0009] The apical surface of the relief section 12 is for applying a sealing compound and imprinting this sealing compound on a base 1. Therefore, the apical surface of the relief section 12 serves as the same configuration as the gestalt of a sealing compound 2 established on a base 1. The sealing compound 2 serves as a gestalt which surrounds the orientation film 3 by the line, and, specifically, generally, serves as an abbreviation quadrilateral. Therefore, the apical surface of the relief section 12 also serves as a configuration which surrounds the orientation film 3 by the line, and, generally it has an abbreviation quadrilateral. since width of face serves as a line narrow as for the apical surface of the relief section 12 -- this invention -- setting -- a line -- it is expressed as the relief section 12. Generally the width of face of the apical surface of the relief section 12 is 200-400 micrometers. The width of face of the sealing compound imprinted as the width of face of an apical surface is less than 200 micrometers is also set to about 200 micrometers or less, and there is a possibility that seal reinforcement may fall. Moreover, if the width of face of an apical surface exceeds 400 micrometers, since a part with the wide width of face of a sealing compound and a liquid crystal display will become large, it is not desirable. In addition, in drawing 3, although the apical surface of the relief section 12 and the unification section with a base material 11 serve as abbreviation same width of face, generally width of face is [ the direction of the unification section ] large.

[0010] The important thing in this invention is that the crevice is established in the apical surface of the relief section 12. While filling up with the sealing compound applied to this crevice, a sealing compound rides also on fields other than a crevice. Even if crevices are what kind of configuration and the depth, they do not interfere. desirable one -- a line -- the longitudinal direction of the relief section 12 -- meeting -- a line -- it is the example in which the crevice 13 is established. a line -- although 1 or 2 are sufficient as a crevice 13 and at least three do not interfere, the number of the most desirable one is three. Although this reason is not certain, it is because the sealing compound 2 imprinted by the base 1 tends to become uniform.

[0011] Moreover, many approximate circle pillar-shaped crevices 14 may be established in the apical

surface of the relief section 12. In this case, heights are formed between the approximate circle pillar-shaped crevices 14. And while filling up with the sealing compound applied to this approximate circle pillar-shaped crevice 14, a sealing compound rides also on a heights apical surface and other apical surfaces. Moreover, the grid-like crevice (not shown) may be established in the apical surface of the relief section 12. In this case, heights are formed between grid-like crevices. And while filling up with the sealing compound applied to this grid-like crevice, a sealing compound rides also on a heights apical surface and other apical surfaces. the case where the approximate circle pillar-shaped crevice 14 and a grid-like crevice are formed -- a line -- it is better not to establish this crevice in the fixed field of the both ends of the relief section 12. When the approximate circle pillar-shaped crevice 14 and a grid-like crevice are established in both ends, this part is filled up with a sealing compound, a notch arises in the edge of the imprinted sealing compound, and there is a possibility that the sharp imprint of a sealing compound cannot be performed.

[0012] a line -- although the depth of a crevice 13 or the various crevices of approximate circle pillar-shaped crevice 14 grade is arbitrary, about 5-50 micrometers is desirable. There is a possibility that the fill of a sealing compound may decrease that the depth is less than 5 micrometers, and the amount of imprints may decrease. Moreover, if the depth exceeds 50 micrometers, it will become difficult to prepare two or more crevices. for example, one line -- although what exceeds a depth of 50 micrometers as it is the case of a crevice 13 can be obtained, there is an inclination for the homogeneity of the imprinted sealing compound to fall in this case. moreover, the line formed in the apical surface of the relief section 12 -- the whole crevice products, such as a crevice 13 and an approximate circle pillar-shaped crevice, -- a line -- it is desirable that it is about three per [ 1mm die length of the relief section ],  $7.00 \times 10^{-4}$  mm<sup>3</sup> -  $3.00 \times 10^{-2}$  mm.

[0013] A sealing compound is applied to a form plate using the printing version explained above. Since a form plate is an apical surface of the relief section 12, a sealing compound is applied to this field. If it does so, since the crevice is formed in the apical surface, this crevice will also be filled up with a sealing compound. Then, if it is made to contact based on this printing version, it can print based on the applied sealing compound (imprint). In addition, as a sealing compound, if well-known, it is conventionally desirable to be able to use anythings and to use epoxy system resin typically. Moreover, although there is especially no limit also about the viscosity of a sealing compound, it is good to use the thing of 20,000 to 40,000 centipoise preferably.

[0014]

[Example] Hereafter, although this invention is explained based on an example, this invention is not limited to an example. If a crevice is established in the apical surface of the relief section of the printing version, this invention can imprint the sealing compound for lamination of a liquid crystal base to homogeneity comparatively so much at a liquid crystal base, and it should be interpreted noting that it is based on the knowledge that the sharp imprint of a sealing compound can moreover be performed.

[0015] After slushing an example 1 liquefied photopolymer (Asahi Chemical Industry [ Co., Ltd. ] make: APR resin K-11) within the limit, it exposed extensively for 70 seconds from the side used as a base material, the liquefied photopolymer was stiffened, and the base material was obtained. Next, it exposed for 65 seconds through the negative film, and the relief section was obtained from the side used as the relief section. Then, negatives were developed in the alkali surfactant water solution (Asahi Chemical Industry [ Co., Ltd. ] make: W-6), and the printing version was obtained. in addition, although the negative film has an exposure part with a width of face of 300 micrometers as shown in drawing 5 (this exposure part is a relief section formation part.), one non-exposed area (black section: piece about 200 micrometers) prepares it in the core of this exposure part -- having -- \*\*\*\* -- the apical surface of the relief section -- one line -- a crevice can be formed.

[0016] thus, the obtained printing version -- the base material thickness of 1.5mm -- the relief section thickness (relief section height) of 0.75mm -- it is -- the width of face of the relief section -- 300 micrometers -- it is -- a line -- a crevice -- a line -- one was formed along with the longitudinal direction of the relief section. and a line -- the width of face of a crevice -- 228 micrometers -- it is -- a line -- the depth of a crevice was 136 micrometers. a line -- \*\*\*\*\* it is a trigonum about the cross section of a

crevice -- a line -- the line per relief section die length of 1mm -- the whole crevice product was  $1.55 \times 10^{-2}$  mm<sup>3</sup> in calculated value.

[0017] It considered as the mode which showed the relief section formation part of example 2 negative film to drawing 6, and also the printing version was obtained by the same approach as an example 1. although the negative film has an exposure part with a width of face of 300 micrometers, two non-exposed areas (black section: piece about 80 micrometers) prepare it in the core of this exposure part -- having -- \*\*\*\* -- the apical surface of the relief section -- two lines -- a crevice can be formed. the width of face of the base material thickness of the obtained printing version, relief section thickness, and the relief section -- an example 1 -- the same -- a line -- a crevice -- a line -- two were formed along with the longitudinal direction of the relief section. and a line -- the width of face of a crevice -- 80 micrometers -- it is -- a line -- the depth of a crevice was 32 micrometers. a line -- \*\*\*\*\* it is a trigonum about the cross section of a crevice -- a line -- the line per relief section die length of 1mm -- the whole crevice product was  $2.56 \times 10^{-3}$  mm<sup>3</sup> in calculated value.

[0018] It considered as the mode which showed the relief section formation part of example 3 negative film to drawing 7, and also the printing version was obtained by the same approach as an example 1. although the negative film has an exposure part with a width of face of 300 micrometers, three non-exposed areas (black section: piece about 30 micrometers) prepare it in the core of this exposure part -- having -- \*\*\*\* -- the apical surface of the relief section -- three lines -- a crevice can be formed. the width of face of the base material thickness of the obtained printing version, relief section thickness, and the relief section -- an example 1 -- the same -- a line -- a crevice -- a line -- three were formed along with the longitudinal direction of the relief section. and a line -- the width of face of a crevice -- 33 micrometers -- it is -- a line -- the depth of a crevice was 15 micrometers. a line -- \*\*\*\*\* it is a trigonum about the cross section of a crevice -- a line -- the line per relief section die length of 1mm -- the whole crevice product was  $7.34 \times 10^{-4}$  mm<sup>3</sup> in calculated value.

[0019] It considered as the mode which showed the relief section formation part of example 4 negative film to drawing 8, and also the printing version was obtained by the same approach as an example 1. Although the negative film has an exposure part with a width of face of 300 micrometers, the non-exposed area (halftone dot of 400 lines) is established in the central field (field width of face of 177 micrometers) of this exposure part, and it can form many approximate circle pillar-shaped crevices in the apical surface of the relief section. The width of face of the base material thickness of the obtained printing version, relief section thickness, and the relief section is the same as that of an example 1, and many approximate circle pillar-shaped crevices were formed. And the depth of an approximate circle pillar-shaped crevice was 22 micrometers. \*\*\*\*\* the configuration of an approximate circle pillar-shaped crevice is a cylinder -- a line -- the whole approximate circle pillar-shaped crevice product per relief section die length of 1mm was  $3.24 \times 10^{-3}$  mm<sup>3</sup> in calculated value.

[0020] It considered as the mode which showed the relief section formation part of example 5 negative film to drawing 9, and also the printing version was obtained by the same approach as an example 1. Although the negative film has an exposure part with a width of face of 300 micrometers, the non-exposed area (grid of 83-micrometer pitch) is established in the central field (field width of face of 187 micrometers) of this exposure part, and it can form a grid-like crevice in the apical surface of the relief section. The width of face of the base material thickness of the obtained printing version, relief section thickness, and the relief section is the same as that of an example 1, and the grid-like crevice was formed. And the depth of a grid-like crevice was 13 micrometers. \*\*\*\*\* the cross section of each grid is a triangle -- a line -- the whole grid-like crevice product per relief section die length of 1mm was  $8.45 \times 10^{-4}$  mm<sup>3</sup> in calculated value.

[0021] Each printing version obtained as mentioned above was attached in the printing machine (MT system company make: FC33S), and the sealing compound was imprinted on the glass base with a thickness of about 1.1mm using the sealing compound (Mitsui Chemicals [ , Inc. ] make: SUTORAKUTO bond "XN-5A", viscosity 18,800 mPa-s). The result was as being shown in Table 1. In addition, the test method of each item is as follows.

[Imprint width of face] Width of face of the sealing compound imprinted by the glass base was surveyed

with the microscope by KEYENCE CORP.

[Imprint height] The height of the sealing compound imprinted by the glass base was surveyed with the super-depth configuration measuring microscope by KEYENCE CORP.

The [amount of imprints] The amount of the sealing compound imprinted by the glass base was calculated from the imprint width of face of a sealing compound, and imprint height.

[Leveling judging] Viewing estimated the homogeneity of the sealing compound imprinted by the glass base on the following criteria with the microscope by KEYENCE CORP.

O : the sealing compound was extremely imprinted by homogeneity.

O : the sealing compound was imprinted by homogeneity.

\*\* : The sealing compound was imprinted in general by homogeneity.

x : The sealing compound was imprinted by the ununiformity.

[Sharpness of an imprint] Viewing estimated on the following criteria how many notches exist in the edge of the sealing compound imprinted by the glass base.

O : GIZAGISA hardly existed in the edge of a sealing compound.

O : a notch was not looked at in general by \*\*\*\* of a sealing compound.

\*\* : The notch was looked at a little by the edge of a sealing compound.

x : The notch remarkable to the edge of a sealing compound was seen.

[0022]

[Table 1]

		転写幅 μm	転写高さ μm	転写量 (mm <sup>3</sup> )	レベリン グ判定	転写の 鮮鋭さ
実 施 例	1	3 1 0	1 0	$3.16 \times 10^{-3}$	△	◎
	2	3 3 0	1 2	$3.96 \times 10^{-3}$	△	◎
	3	3 2 5	1 1	$3.58 \times 10^{-3}$	◎	◎
	4	3 4 5	1 4. 8	$5.11 \times 10^{-3}$	○	◎
	5	3 2 0	1 2. 6	$4.03 \times 10^{-3}$	○	◎

[0023] If the printing version concerning examples 1-5 is used so that clearly from the result of Table 1, the edge of the sealing compound which could imprint comparatively a lot of sealing compounds to homogeneity at the whole, and was imprinted will also become sharp.

[0024]

[Function] if the sealing compound for liquid crystal base lamination is imprinted on a glass base etc. using the printing version concerning this invention -- a line -- since the crevice is established in the apical surface of the relief section, comparatively a lot of sealing compounds can be imprinted. And it can prevent that the part where a sealing compound is not imprinted is generated. Furthermore, the edge of the imprinted sealing compound will become sharp.

[0025]

[Effect of the Invention] Therefore, if the printing version concerning this invention is used, since comparatively a lot of sealing compounds can be imprinted, desired imprint height is obtained and sufficient gap to enclose liquid crystal can be obtained. Moreover, since it is hard to produce the part where a sealing compound is not imprinted, the glass base by which the sealing compound was imprinted is stuck. including air in a sealing compound, when a liquid crystal display is created -- there is nothing (\*\* existence of the part where a sealing compound is not imprinted includes air in a sealing compound -- things --) This air expands, it can prevent that lamination exfoliates, and the effectiveness that the leakage of the liquid crystal from a liquid crystal display can prevent is done so. Moreover, since the edge of the imprinted sealing compound is sharp, it can also prevent that a part of sealing compound soils the orientation film.

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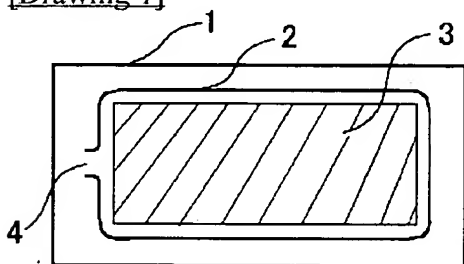
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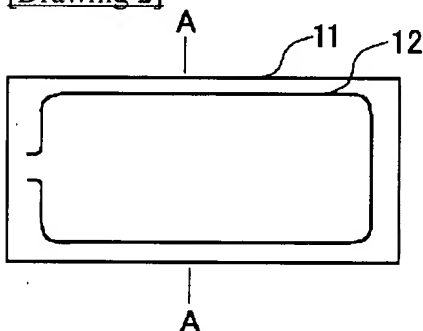
DRAWINGS

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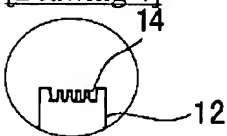
[Drawing 1]



[Drawing 2]



[Drawing 4]



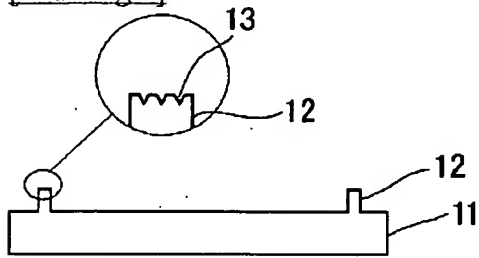
[Drawing 6]



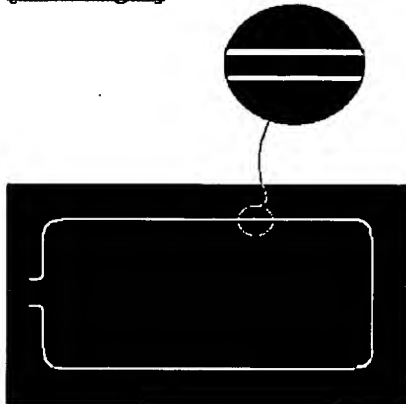
[Drawing 7]



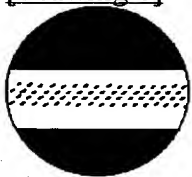
[Drawing 3]



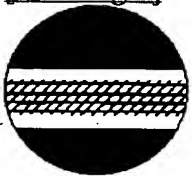
[Drawing 5]



[Drawing 8]



[Drawing 9]



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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the top view having shown the condition that the sealing compound 2 was imprinted by the base 1.

[Drawing 2] It is the typical top view having shown the printing version concerning an example of this invention.

[Drawing 3] The A-A line sectional view of the printing version of drawing 2 is shown typically.

[Drawing 4] It is the extension mimetic diagram having shown the example in which many approximate circle pillar-shaped crevices are established in the apical surface of the relief section 12.

[Drawing 5] It is the typical top view having shown the negative film used in the example 1.

[Drawing 6] It is the extension mimetic diagram having shown a part of relief section formation part of the negative film used in the example 2.

[Drawing 7] It is the extension mimetic diagram having shown a part of relief section formation part of the negative film used in the example 3.

[Drawing 8] It is the extension mimetic diagram having shown a part of relief section formation part of the negative film used in the example 4.

[Drawing 9] It is the extension mimetic diagram having shown a part of relief section formation part of the negative film used in the example 5.

[Description of Notations]

1 Base

2 Sealing Compound

3 Orientation Film

4 Inlet for Pouring in Liquid Crystal

11 Base Material

12 Line -- Relief Section

13 Line -- Crevice

14 Approximate Circle Pillar-shaped Crevice

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[Translation done.]